

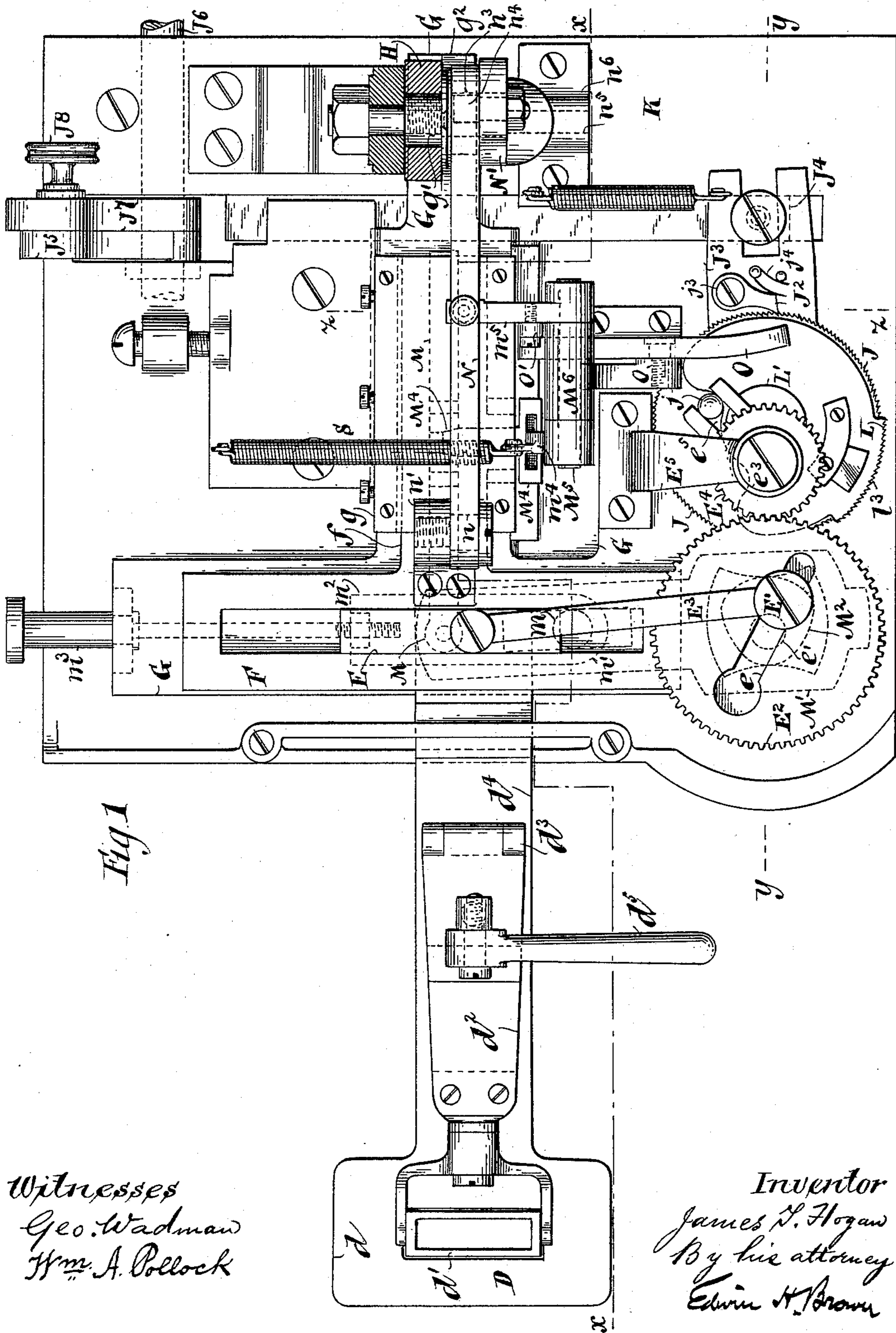
(No Model.)

3 Sheets—Sheet 1.

J. T. HOGAN.
BUTTONHOLE SEWING MACHINE.

No. 596,593.

Patented Jan. 4, 1898.



Witnesses
Geo. Wadman
H^m. A. Pollock

Inventor
James L. Hogan
By his attorney
Edwin H. Brown

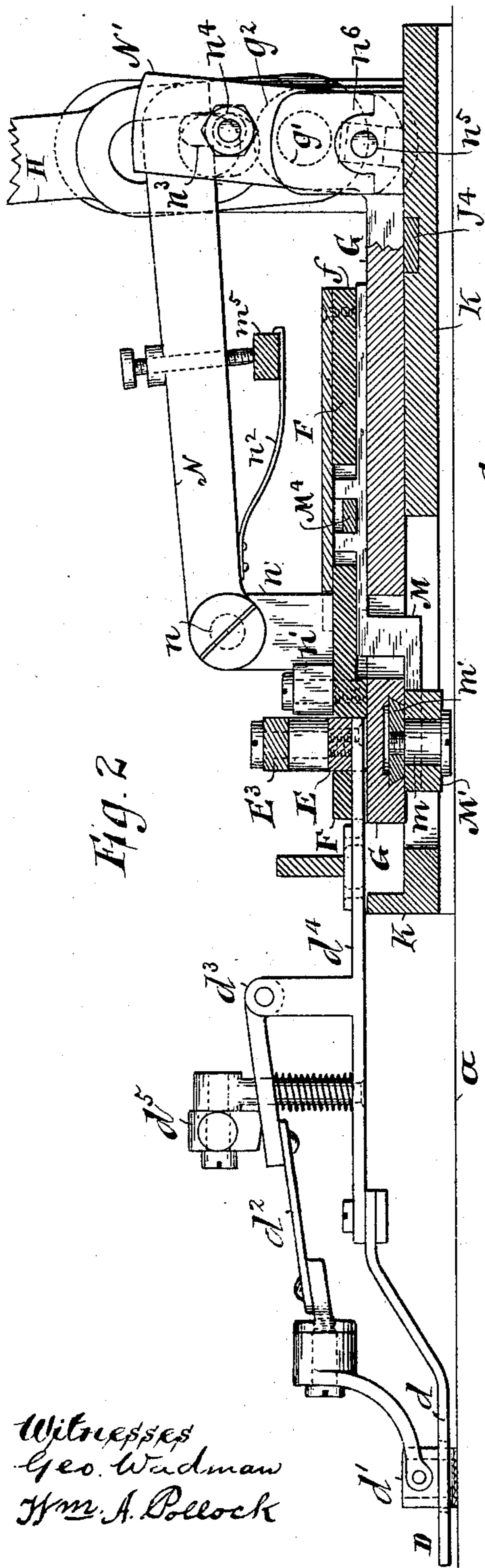
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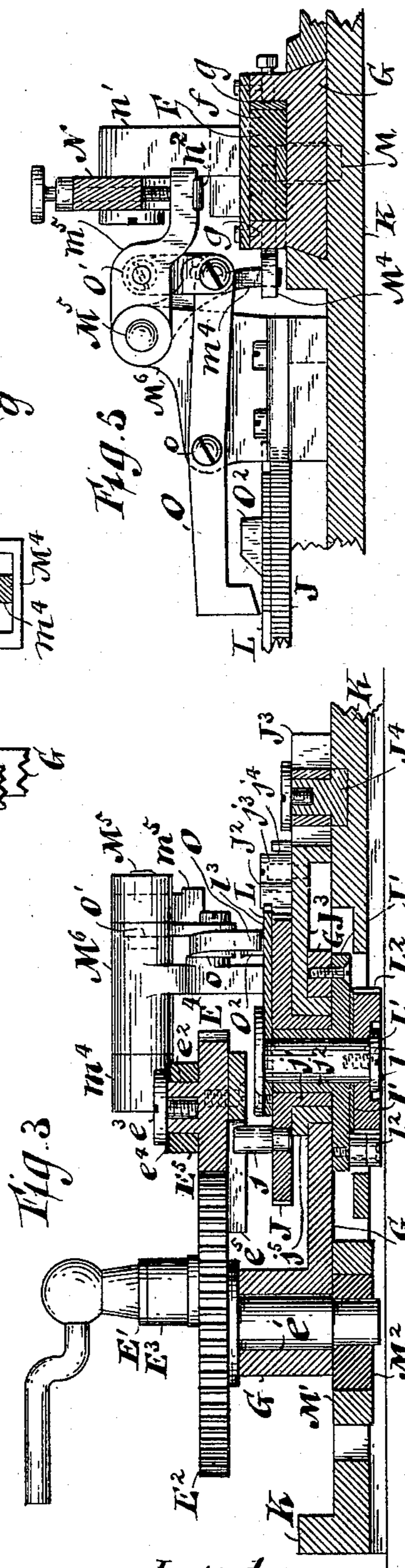
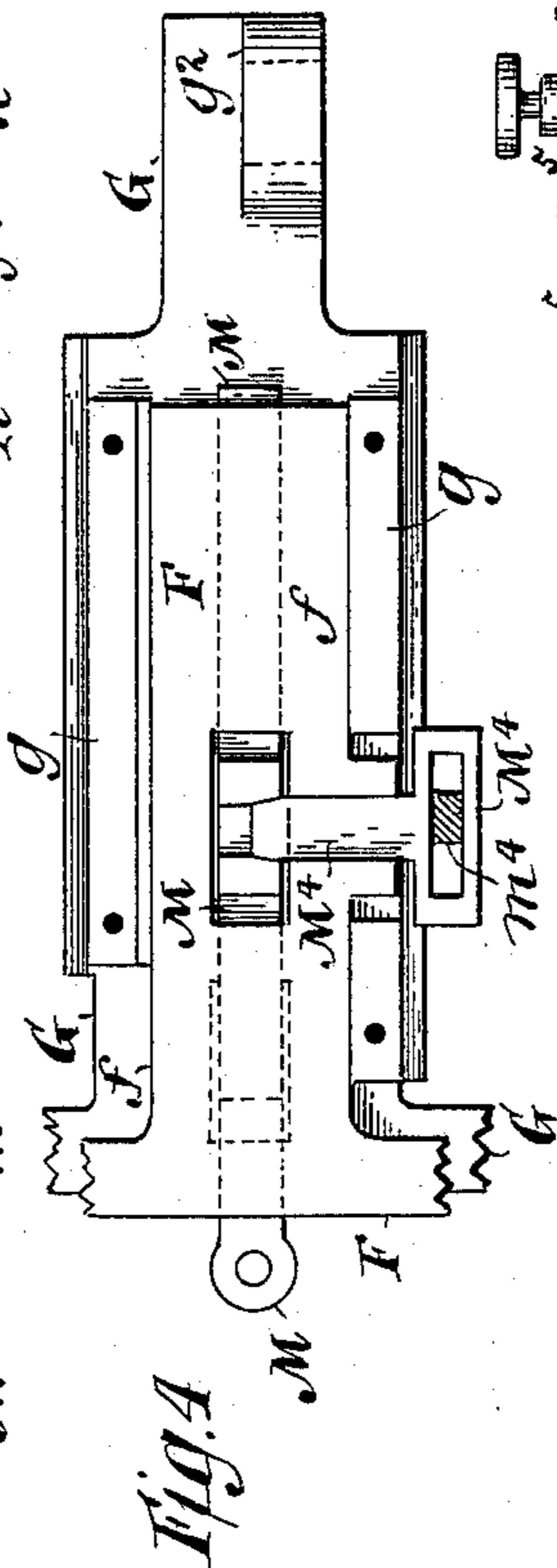
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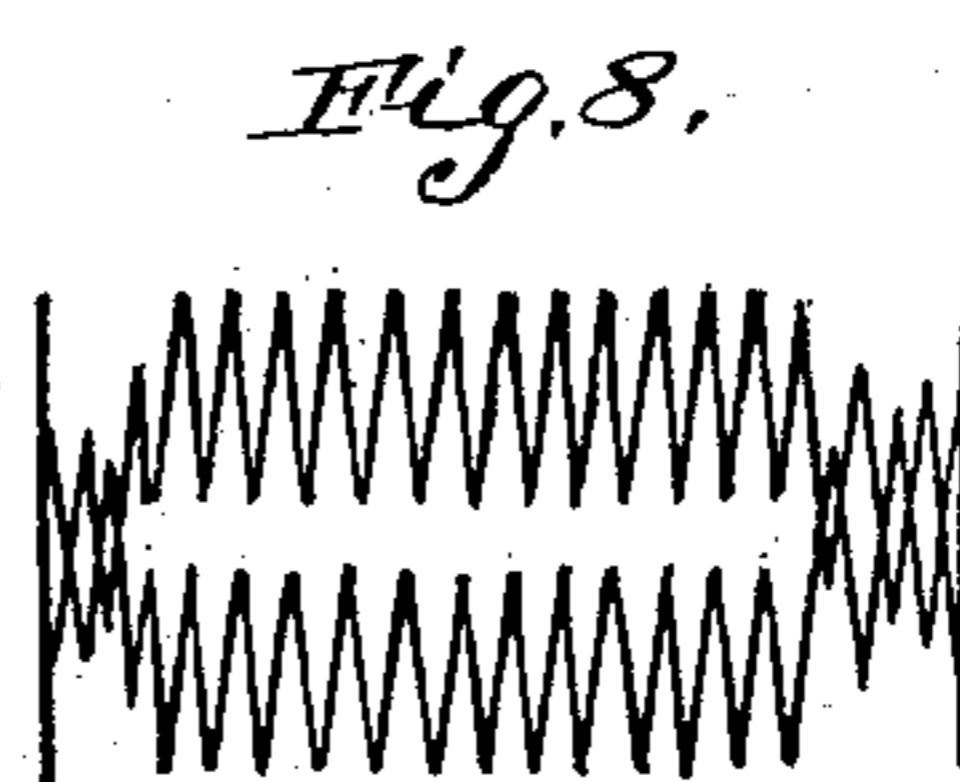
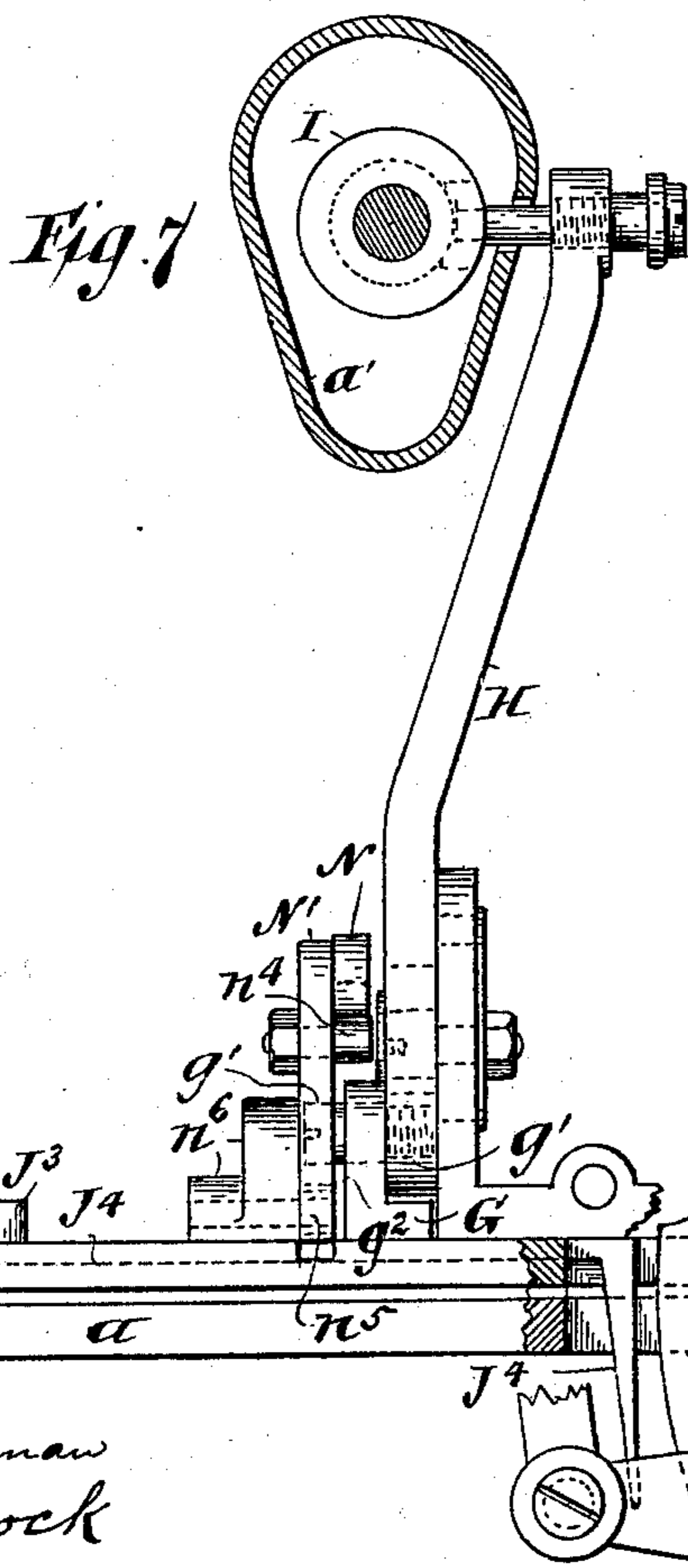
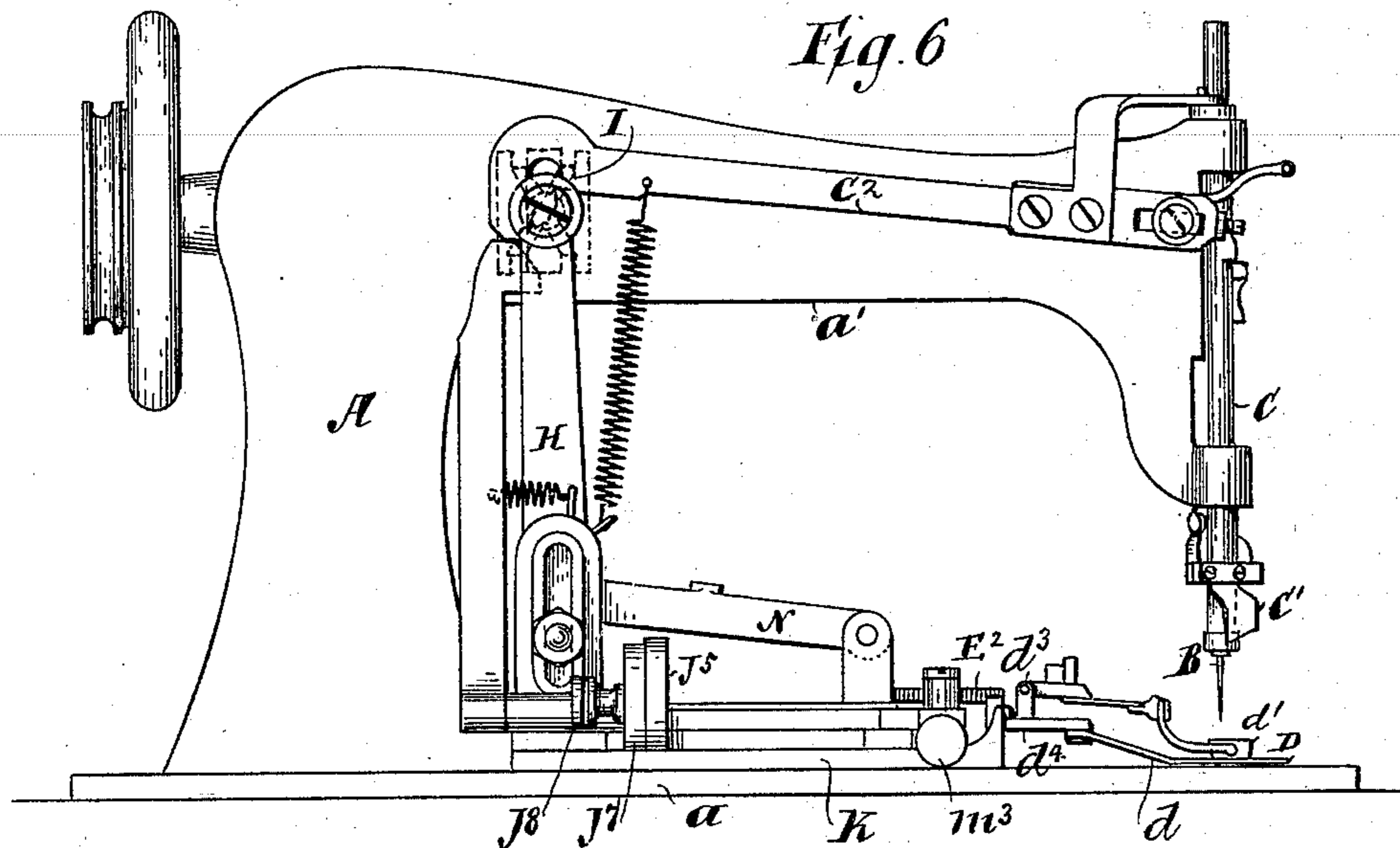
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3 Sheets—Sheet 3.

J. T. HOGAN.
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UNITED STATES PATENT OFFICE.

JAMES T. HOGAN, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO THE
NATIONAL MACHINE COMPANY, OF NEW YORK.

BUTTONHOLE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 596,593, dated January 4, 1898.

Application filed February 17, 1894. Serial No. 500,542. (No model.)

To all whom it may concern:

Be it known that I, JAMES T. HOGAN, of Jersey City, Hudson county, and State of New Jersey, have invented a certain new and useful Improvement in Buttonhole-Sewing Machines, of which the following is a specification.

I will describe a machine embodying my improvement and then point out the novel features in the claims.

In the accompanying drawings, Figure 1 is a plan of a buttonhole-sewing mechanism embodying my improvement. Fig. 2 is a vertical section of the same, taken as indicated by the dotted line xx , Fig. 1. Fig. 3 is a vertical section taken at the plane of the dotted line yy , Fig. 1. Fig. 4 is a top view of a compound slide comprised in the mechanism. Fig. 5 is a vertical section taken at the plane of the dotted line zz , Fig. 1. Fig. 6 is a side elevation of a complete machine embodying the improvement and also having a cutting mechanism. Fig. 7 is a transverse vertical section of the machine, but certain parts which might be shown in this view are omitted. Fig. 8 is a diagrammatic view showing the arrangement of the stitches produced by the mechanism along the sides and across the ends of a buttonhole, the stitches being spread apart. For the sake of clearness the barring-stitches in this figure are also represented as being displaced, in the direction of the buttonhole, from their correct position. As produced by the operation of the machine, the barring-stitches will lie close together, presenting more or less of a bunched appearance.

Similar letters of reference designate corresponding parts in all the figures.

A designates a sewing-machine head, which may be of any suitable form. As shown, it has a base-plate a and a horizontal arm a' . At the end of the arm is fitted a vertically-reciprocating needle-bar, which is provided with a needle B, and adjacent to this needle-bar a vertically-reciprocating cutter-bar C is fitted to the end of the arm. At the lower end of this cutter-bar is a cutter C' . In the present instance the cutter-bar is capable of a rotary or oscillating movement as well as a vertically-reciprocating movement, the ob-

ject of the rotary or oscillating movement being for the purpose of engaging or disengaging the cutter-bar with a depressor working in harmony with the needle-bar and which may, in fact, be attached to the needle-bar. The rotary or oscillating movement of the cutter-bar is produced by means of a rod C^2 .

My invention has nothing to do with either the needle-bar mechanism or the cutter-bar mechanism, and hence the allusion to these parts is merely incidental to a full description of a machine embodying my improvement.

To facilitate an understanding of the mechanism embodying my improvement, it may be well for me to premise that the object of the improvement is to provide for making at the ends of the two rows of side stitches barring-stitches, and preferably these will be double the length of the side stitches. It must be understood, however, that they may be less than double or more than double the length of the side stitches.

In the present example of my improvement I use a cloth-clamp for holding and feeding the material in which the buttonhole is to be formed, and such cloth-clamp may be of any suitable form.

D designates a well-known form of cloth-clamp, composed of a cloth-carrying plate d , a foot d' , an arm d^2 , supporting the foot and connected by a hinge d^3 to a bracket on the shank d^4 of the cloth-carrying plate and forced downwards by means of a cam-lever d^5 .

The shank of the cloth-carrying plate d is connected to the under side of a feed-slide block E, which is shown as made of rectangular form and is fitted to work within a groove in a change-plate F, the movement of said block within the groove of the change-plate being in the direction of the length of a buttonhole and serving to produce the feed of the material in that direction.

The feed-slide block E is shown as deriving its motion from a crank E' , which may be made in the form of a screw-bolt capable of being clamped to the edges of a slot e in a feed-disk E^2 , made in the form of a toothed gear-wheel. The slot e is located diametrically of the feed-disk, and hence the crank E'

may be adjusted radially of the feed-disk to produce a greater or less traverse of the feed-slide block suitable for buttonholes of different lengths. The crank E' is connected by a crank-rod or pitman E^3 with the feed-slide block.

Before passing to a description of parts which have been modified for the purpose of my improvement I will refer to the means whereby the to-and-fro or zigzag motion of the cloth-clamp is produced.

The change-plate F has a shank f , which is fitted to slide in bearings g on the vibrating plate G . The change-plate and vibrating plate may move together and in the same manner transversely to the length of the buttonhole and for the purpose of producing the motion necessary for the two rows of side stitches, which are severally composed of depth and edge stitches. Of course the change-plate carries with it in this movement the feed-slide block E and hence the cloth-clamp.

In my improvement while the long barring-stitches are being made the change-plate receives a different motion from that which the vibrating plate has during the same time. I do not mean that its motion is differently positioned, but that the range of movement is greater, and so much greater, indeed, that, generally speaking, it will be about double the movement which it has with the vibrating plate during the forming of the side stitches.

H designates a lever from which, in the present example of my improvement, the vibrating and change plates derive their motion. Motion is imparted to this lever H by means of a cam I . (Indicated by dotted lines in Fig. 6 and located in the sewing-machine head.)

In the present example of my improvement the vibrating plate G has a permanent pivotal connection with the lever H , such pivotal connection being formed of a pin or stud g' , connecting the lever H with lugs g^2 , with which the vibrating plate is provided. With regard to the change-plate it is, however, quite different, in that the change-plate has no permanent pivotal connection with the lever H , because it has to move different distances at different times. In the present example of my improvement this is accomplished by connecting the change-plate to the vibrating plate and maintaining this connection during the formation of each of the two rows of side stitches, after which the connection is unlocked and a motion different from that of the vibrating plate is given the change-plate while the long barring-stitches are being made.

Having now, as I think, given a sufficient general description of the improvement, I will proceed with the detailed description of the particular embodiment of the improvement illustrated by the drawings.

The feed-disk E^2 is affixed to a short shaft

e' , which is journaled in the vibrating plate. With the feed-disk or gear-wheel E^2 engages a smaller gear-wheel or pinion E^4 , which is of such size as to have one-half the number of teeth of the feed-disk. It is affixed to a short shaft e^2 , which extends upwardly from it (see Fig. 3) and is journaled in a bracket E^5 , carried by the vibrating plate G , a screw e^3 being engaged with a tapped hole in the upper end of the shaft and having a head which extends over the bearing in the bracket. Preferably a friction-washer of leather e^4 will be interposed between the head of the screw e^3 and the bracket E^5 to prevent any undesired movement of the gear-wheel or pinion E^4 .

The bottom of the gear-wheel or pinion E^4 is provided with a radial slot or opening e^5 , which is here shown as being formed in a separate piece of metal attached by screws to said gear-wheel or pinion. With this slot engages a crank-pin or driving-pin j , extending upwardly into it from a feed-wheel J . The feed-wheel J is provided with a tubular hub j' , that surrounds a tubular hub j^2 , extending upwardly from a disk J' , which is fastened to the vibrating plate G by means of screws or otherwise. The tubular hub j^2 therefore forms a stationary stud, about which the feed-wheel J rotates. Motion is imparted to the feed-wheel by means of a pawl J^2 , which is fitted to a screw j^3 , fastened to a pawl-lever J^3 . A spring j^4 holds the pawl normally in engagement with ratchet-teeth on the periphery of the feed-wheel. The pawl-lever J^3 has a tubular hub j^5 , which surrounds the tubular hub j' of the feed-wheel J and fits within a circular hole in the vibrating plate G . It is therefore pivoted to the vibrating plate and aids in supporting the feed-wheel J .

Motion is imparted to the pawl-lever by an arm or rod J^4 , which works in a bed-plate K , which is employed in addition to the bed-plate a of the sewing-machine head, so that the buttonhole-feeding mechanism may be made in the form of an attachment. Motion is imparted to the arm or rod J^4 by means of a crank J^5 , affixed to a shaft J^6 . (See particularly Figs. 1 and 7.)

J^7 is a cam, made in the form of a bar, loosely mounted at one end upon the shaft J^6 and fastened at the other end by any suitable means—as, for example, by a clamping-screw J^8 —to the outer portion of the crank J^5 . It is this cam J^7 which acts upon the suitably-formed end of the arm or rod J^4 . Hence by adjusting the cam relatively to the crank J^5 different degrees of motion may be transmitted from said crank to the arm or rod J^4 , and hence through the pawl-lever J^3 to the feed-wheel J .

It will of course be understood that the feed-wheel J imparts motion through the gear-wheel E^4 to the feed-disk or gear-wheel E^2 , and hence through the feed-slide block E to the cloth-clamp for the purpose of feeding

the material in the direction of the length of a buttonhole.

I will now describe means whereby a dwell is produced after the completion of the row of side stitches to permit of the forming of the barring-stitches.

L designates a plate located above the feed-wheel J. It is intended to bear upon the top of the tubular hub j^2 of the disk J', but not upon the top of the feed-wheel J. It is fastened to a shaft L', the fastening in the present instance being accomplished by providing the shaft L' with a head and engaging this head by screws with said plate. With the lower end of the shaft L' is combined a plate l of larger diameter, so as to support a ratchet-wheel L^2 , which surrounds the shaft L'. The plate l may be fastened to the shaft L' by means of a screw. The ratchet-wheel L^2 is to be interlocked with the shaft L' either by making the bearing-surfaces polygonal or else by means of a spline, so that these two parts will rotate in unison. Between the ratchet-wheel L^2 and the non-rotary disk or plate J' there will preferably be a friction-washer of leather or other suitable material l' , the purpose of this washer being to prevent the ratchet-wheel and hence the shaft L' and plate L from having any undesirable movement. With the ratchet-wheel L^2 is combined a pawl l^2 for the purpose of preventing the ratchet-wheel and hence the shaft L' and plate L from rotating in the wrong direction. The plate L is provided with a segment or rim l^3 , which extends over the periphery of the feed-wheel J. During the formation of each of the two rows of side stitches the plate L is carried by the feed-wheel J and has no independent movement; but when, by means of the rotation of the feed-wheel J, this segment l^3 is brought opposite to the pawl it will move or lift the pawl out of engagement with the ratchet-teeth of the feed-wheel, and then the pawl will coast with the ratchet-teeth of said segment l^3 , whereupon the pawl will cease to impart any motion to the feed-wheel, but will impart an independent motion to the plate L. During this time the feed-wheel will be held against movement by friction. During the time that the feed-wheel is thus inert the barring-stitches will be made. When the pawl has acted upon all the ratchet-teeth of the segment l^3 , it moves back into engagement with the ratchet-teeth of the feed-wheel J. This of course will not happen until after the completion of the barring-stitches at one end of the buttonhole. After the completion of a set of barring-stitches the plate L will remain at rest until the pin j , which has previously been mentioned as imparting motion from the feed-wheel J to the gear-wheel or pinion E^4 , moves into contact with an opposite edge of the plate L. This action may be readily understood by reference to Fig. 1.

Having now explained in detail the means for producing the dwell in the feed mechanism for moving the material in the direction

of the length of the buttonhole, I will proceed to describe the mechanism from which the change-plate F derives its motion. The means for locking the change-plate to the vibrating plate may be best understood by reference to Fig. 4.

M designates a connecting-rod, which is here shown as made in the form of a slide, which is provided with a hole for the reception of a pin, whereby it is connected with an oscillating frame or strap M', made in the form of a lever and coöperating with the change-cam M^2 .

The fulcrum of the lever M' is a screw or pin m , fastened to a block m' , adjustably connected with the vibrating plate. This block m' is directly connected with a slide m^2 , which may be adjusted by means of a screw m^3 for varying the width of the bight of a buttonhole, or, in other words, the space between the two rows of side stitches. At one end there is an opening in the lever M', and in this opening works the change-cam M^2 , said cam being affixed to the stud e' , and hence being rotated with the feed-disk or gear-wheel E^2 .

The purpose of the change-cam M^2 is to change the position of the change-plate relatively to the vibrating plate, this being done preparatory to the making of the long barring-stitches, so that the material will be shifted to cause these barring-stitches to extend equally in both directions across the center line of the buttonhole. The change-cam therefore will shift the lever M', and hence the change-plate F, relatively to the vibrating plate G at the termination of each row of side stitches.

The connecting-rod M is not permanently locked to the change-plate, but is only locked thereto during the formation of each row of side stitches and those stitches at the ends of the buttonhole, excepting the long barring-stitches, the means employed in the present instance for locking it consisting of a bolt M^4 , which works transversely through one side of the shank f of the change-plate and into and out of a notch or recess which is formed transversely in the connecting-rod M. This bolt M^4 is operated by means of an arm m^4 , affixed to a shaft M^5 , which is supported by means of a bracket M^6 , carried by the vibrating plate. The arm m^4 has of course to pass through a slot or notch in the bolt M^4 , so as to permit of the independent movement of the change-plate.

Just before the beginning of either set of long barring-stitches the bolt M^4 will be withdrawn from the connecting-rod M, and thus it will unlock the change-plate from said connecting-rod. As the change-cam makes one rotation for each buttonhole and only shifts the lever M' at the completion of each row of side stitches, it follows that this cam maintains the connection between the vibrating plate and change-plate during the formation of each of the rows of side stitches. Because of this the locking and unlocking of the change-plate relatively to the connecting-rod

M, by means of the bolt M^4 , practically amounts to locking and unlocking the change-plate relatively to the vibrating plate.

Having now explained the means for locking and unlocking the change-plate relatively to the vibrating plate, I will proceed to describe the means for operating the change-plate while it is unlocked from the vibrating plate.

N designates a rod pivoted at one end upon a screw n , which enters a bracket n' , mounted on and carried by the change-plate. During the formation of each row of side stitches this rod N is inert, and in the present instance is supported in an elevated position by means of an arm m^5 , affixed to the rock-shaft M^5 . The downward movement of the rod N may be effected by means of the arm m^5 and a spring n^2 , fastened to the under side of said rod and extending under the arm m^5 , against the under side of which arm m^5 said spring n^2 forcibly presses. A screw n^7 enters a tapped hole in the rod N and impinges against the arm m^5 , serving to adjust the relative distance between the rod and the arm. The rod N has a notch n^8 in the under side near its free end, and this notch is capable of engaging with a pin n^4 on a lever N' .

The lever N' is fulcrumed by means of a pin or stud n^5 , working in a bearing formed in a lug n^6 , extended from the bed-plate K. The fulcrum g' of the lever H oscillates the lever N' , it being enabled to do this because said fulcrum is formed in an appurtenance of the vibrating plate, and hence vibrates relatively to the fixed fulcrum n^5 of the lever N' , the said fixed fulcrum n^5 being upon the stationary base-plate K.

The lever N' oscillates all the time when the lever H oscillates, but it does no work except when the rod N is engaged with it. The engagement of the rod N with the lever N' is effected after the completion of each row of side stitches when the change-plate has been adjusted by the change-cam properly to present the material for the long barring-stitches and after the change-plate has been unlocked from the vibrating plate.

The pin n^4 of the lever N' is, it will be seen, about twice as far from the fulcrum n^5 of said lever as the pin or stud g' is from said fulcrum, and owing to this the pin or stud g' by its vibrations with the vibrating plate is enabled to impart about twice its own range of motion to the change-plate. Preferably the pin n^4 will be fitted to a slide formed longitudinally in the lever N' , so that it may be adjusted lengthwise of said lever to vary the length of the long barring-stitches.

It now remains to explain the means for controlling the rod N.

O designates a lever which is fulcrumed by a pin or screw o to the bracket M^6 , and it is pivoted by a link O' to the arm m^5 , which is affixed to the rock-shaft M^5 . Hence any oscillation of the lever O will be imparted to the arm m^5 and through the latter to the rock-

shaft and the arm m^4 , which is affixed to the latter. With the arm m^4 of the rock-shaft M^5 is combined a spring S, one end of which is fastened to said arm and the other to an appurtenance of the base-plate K. This spring so coacts with the parts as to normally hold the rod N in an elevated position and also to maintain the bolt M^4 in position to lock the change-plate to the connecting-rod M.

The oscillation of the lever O against the resistance of the spring S, so as to withdraw the bolt M^4 , and thereby effect the unlocking of the change-plate and the connecting-rod M, and so also as to effect the lowering of the rod N into engagement with the lever N' , is effected by means of a cam O^2 , carried by the plate L. This cam will perform its work at the time the pawl J^2 is coacting with the segment l^3 of the plate L.

By the mechanism which I have described a complete row of side stitches may first be formed. Then the change-plate will by the change-cam be shifted relatively to the vibrating plate, so as to cause barring-stitches of the same length as the side stitches to be made progressively more and more to one side of the said row of side stitches until the last will be made to extend equally across the center line of the buttonhole. Next, by unlocking the change-plate and giving it a greater range of vibration by means of the lever N' barring-stitches substantially double the length of the side stitches may be made across the center line of the buttonhole. Then stitches of a length equal to the side stitches will be made, the first being equally extended across the center line of the buttonholes and the others being progressively more and more to one side of this line until finally the line of second row of side stitches will be reached. Then the second row of side stitches will be formed. Finally, barring-stitches, composed of short and long stitches, will be made in the manner described, but at the other end of the buttonhole.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a buttonhole-sewing machine, the combination with stitching mechanism, of a cloth-carrying plate, means for producing a relative feed between the stitching mechanism and the cloth-carrying plate, mechanism for producing a vibratory movement of the cloth-carrying plate for the side stitches of the buttonhole, mechanism for producing a series of short barring-stitches progressively approaching and crossing the center line of the buttonhole at the extremities thereof and means for producing a vibratory movement of the cloth-carrying plate of greater amplitude for longer barring-stitches, substantially as specified.

2. In a buttonhole-sewing machine the combination with stitching mechanism, of a cloth-carrying plate, means for producing a relative feed between the stitching mechan-

ism and the cloth-carrying plate, mechanism for producing a vibratory movement of the cloth-carrying plate to form the side stitches of the buttonhole, mechanism for gradually
 5 changing the throw of the cloth-carrying plate to permit the stitching mechanism to form a series of short barring-stitches gradually approaching and crossing the center line of the buttonhole at the extremities thereof,
 10 means for producing a vibratory movement of the cloth-carrying plate of greater amplitude than that occurring during the formation of the short barring-stitches or the side stitches, and mechanism for gradually chang-
 15 ing the throw of the cloth-carrying plate to permit the stitching mechanism to form a return set of short barring-stitches gradually approaching and crossing the center line of the buttonhole at the extremities thereof,
 20 substantially as specified.

3. In a buttonhole-sewing machine, the combination with stitching mechanism of a plate for supporting the fabric in which the buttonhole is to be formed, a vibratory plate
 25 connected to the cloth-supporting plate through the change-plate, means for imparting to the vibratory plate the to-and-fro motion necessary for producing the side stitches of the buttonhole, a change-plate to which the
 30 plate for supporting the fabric is secured and which moves at times with the vibratory plate, mechanism for varying the throw of the cloth-carrying plate to permit the stitching mechanism to form a series of short barring-stitches
 35 gradually approaching and crossing the center line of the buttonhole at the extremities thereof, and mechanism for disengaging the change-plate from the vibratory plate and imparting to the former an independent vibra-
 40 tory movement of greater amplitude than the series of barring-stitches or the side stitches, substantially as specified.

4. In a buttonhole-sewing machine, the combination of a plate for supporting the
 45 fabric in which the buttonhole is to be formed, mechanism for feeding this plate in the direction of the length of a buttonhole, mechanism for imparting to the plate a vibratory motion to form the side stitches of the button-
 50 hole, mechanism for changing the throw of the cloth-carrying plate to permit the stitching mechanism to form a series of short barring-stitches progressively approaching and crossing the center line of the buttonhole at the ex-
 55 tremities thereof, an independent mechanism for imparting to the plate a vibratory motion of greater amplitude to form a series of barring-stitches longer than the side stitches or short barring-stitches, means for changing the
 60 throw of the cloth-carrying plate to permit the

stitching mechanism to form a return series of short barring-stitches gradually approach-
 ing and crossing the center line of the but-
 tonhole, and means for suspending the length-
 wise-feeding movement during the formation 65
 of the longer barring-stitches, substantially as specified.

5. In a buttonhole-sewing machine, the combination with stitching mechanism, of a
 plate for supporting the fabric in which the 70
 buttonhole is to be formed, a vibratory plate, means for imparting to the vibratory plate the to-and-fro motion necessary for produc-
 ing stitches, a change-plate to which the plate
 for supporting the fabric is secured and which 75
 moves at times with the vibratory plate, a change-cam mounted on the vibratory plate, a lever coöperating with the change-cam, a rod connecting with the lever, a bolt for en-
 gaging said rod with and disengaging it from 80
 the change-plate, and mechanism for imparting to the change-plate, when the bolt has disengaged the rod therefrom, a vibratory move-
 ment of greater amplitude than that of the
 corresponding movement of the vibratory 85
 plate, substantially as and for the purpose set forth.

6. In a buttonhole-sewing machine, the combination with stitching mechanism, of a
 plate for supporting the fabric in which the 90
 buttonhole is to be formed, a vibratory plate, means for imparting to the vibratory plate the to-and-fro motion necessary for produc-
 ing stitches, a change-plate to which the plate
 for supporting the fabric is secured and which 95
 moves at times with the vibratory plate, mechanism which at times causes the change-plate to move with the vibratory plate and at other
 times releases it therefrom, a lever N', a stud
 adjustable lengthwise of said lever, and a rod 100
 N which is engaged through said stud with said lever N' when the aforesaid mechanism releases the change-plate from the vibratory
 plate, and which is disengaged from said lever
 N' when said mechanism causes the change- 105
 plate to move with the vibratory plate, substantially as specified.

7. In a sewing-machine, a feed device, a rock-shaft for imparting motion to said feed
 device, an arm attached to said rock-shaft, 110
 and a cam-arm loosely mounted upon said shaft and adjustably connected to the arm on the shaft, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of 115
 two subscribing witnesses.

JAMES T. HOGAN.

Witnesses:

ANTHONY GREF,
 S. A. PALMER.